

positioning the subsurface target relative to the apparatus in the imaging machine such a way that an image of the subsurface target and images of the plurality of fiducials can be observed on the output device and a location of the image of the subsurface target relative to the images of fiducials can be determined; and

C⁵
repositioning the plurality of fiducials so that a new location of the image of the subsurface target relative to the images of the plurality of fiducials is the desired location.

C⁶
51. (Thrice amended) A method of positioning an apparatus for determining a direction of approach to a subsurface target in an imaging machine, the imaging machine comprising an image plane having a plurality of degrees of freedom, the method comprising the steps of: providing a support structure having at least one rotational and at least two translational degrees of freedom;

providing at least two fiducials carried by the support structure;

positioning the support structure to locate the fiducials outwardly of the surface in a manner defining an air gap between the fiducials and the surface; and

positioning the fiducials in the image plane of the imaging machine by moving the support structure along its at least one degree of freedom.

Remarks

Claims 1-53 are pending in the application.

Objection to Claims 1-53

The Examiner has objected to claims 1-53 because in the independent claims the recitation of "the subsurface target being located below a surface" is redundant in that a subsurface target is inherently located below a surface. Applicants believe the amendments to

the independent claims 1, 16, 26, 36, 46, and 51, deleting “the subsurface target being located below a surface”, have removed the basis for this objection.

Rejection of claims 1, 7-11, 13, 14, 16-18, 21-22, 24, 26, 29, 30, 33, 34, 36-40, 42-44, 46, 48-53 under 35 USC 102(b)

The Examiner has rejected the above claims under 35 USC 102(b) as being anticipated by Kalfas et al., wherein a system for defining a direction of approach to a subsurface structure is disclosed. The Examiner suggests the system includes a wand which comprises a support structure. Applicants respectfully submit that the wand described by Kalfas et al. does not comprise a support structure. Figure 1A and column 2, lines 52-55 of Kalfas et al. demonstrate that the support structure 10 is an operating table or other subject support on which the patient may be positioned. In contrast, the support structure of the present application is a support for a plurality of fiducials (claim 1). Kalfas et al. does not suggest in any way that the fiducials may be mounted on the support structure.

The Examiner indicates Kalfas et al. is silent with respect to the materials used for the support structure, and that in the absence of a showing of criticality for the specific shape of the support structure chosen, the support structure in the present application would have been an obvious design choice. Applicants respectfully submit that the choice of shape for the support structure in the present application is an element of the usefulness of the invention and is not obvious. The support structure in the present invention carries a plurality of fiducials. The support structure has a size and shape which locates the fiducials outwardly of the surface (claim 1), and further, in accordance with the claims amended herewith, can be moved both translationally and rotationally such that the target localization system enabled by the support structure has as many degrees of freedom as the image plane of an imaging machine (pages 3-4). Kalfas et al. does not in any way suggest attaching fiducials to the support structure such that they are translationally and rotationally movable.

Rejection of claims 1, 3, 7-11, 13, 16-18, 21-22, 26, 29-30, 33, 51-53 under 35 USC 102(e)

The Examiner has rejected the above claims under 35 USC 102(e) as being unpatentable over Braband and suggests that Braband discloses a system for defining a direction of approach to a subsurface target which includes a support structure carrying a plurality of fiducials which define the approach path relative to the support structure, and includes a visible light source and a reflector. Applicants respectfully point out that the unit 12 disclosed by Braband is limited to being moveable only with respect to the transverse member 11 (column 7, lines 9-12). Even the suggested possibility of moving the unit over the transition region 28 (column 11, lines 13-15) does not render the unit rotationally movable. In contrast, the support structure of the present invention in accordance with the claims amended herewith includes a support structure that can be moved both translationally and rotationally, and is therefore distinct from the device of Braband.

Rejection of claims 2, 4-6, 12, 14, 15, 19, 20, 23-25, 27, 28, 31, 32, 34, and 35 under 35 USC 103(a)

The Examiner has rejected the above claims under 35 USC 103(a) as being unpatentable over Braband and suggests that Braband discloses a system for defining a direction of approach to a subsurface target which includes a support structure carrying a plurality of fiducials which define the approach path relative to the support structure, and includes a visible light source and a reflector. As for the Examiner's rejection under 102(e), applicants respectfully point out that the unit 12 disclosed by Braband is limited to being moveable only with respect to the transverse member 11 (column 7, lines 9-12). Even the suggested possibility of moving the unit over the transition region 28 (column 11, lines 13-15) does not render the unit rotationally movable. In contrast, the support structure of the present invention in accordance with the claims amended herewith includes a support structure that can be moved both translationally and rotationally, and is therefore distinct from the device of Braband.

Summary

Based on the amendments and arguments presented above, Applicants respectfully assert that the cited references do not render the instant invention anticipated or obvious to one skilled in the art. Therefore, Applicants believe that claims 1-53 of the present invention are in a condition for allowance and therefore respectfully request the Examiner to withdraw the rejections and allow these claims.

If a discussion with the Applicants' attorney will facilitate the allowance of this application, Examiner Goldberg is respectfully requested to call the undersigned at 716-848-1430.

A petition for one month extension of time and fee payment are included herewith.

Respectfully submitted,



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Marked up version of amended claims

1. (Thrice amended) An apparatus for defining a direction of approach to a subsurface target along a predetermined path for use with imaging equipment, [the subsurface target being located below a surface,]the apparatus comprising:

a support structure carrying a plurality of fiducials defining the predetermined path relative to the support structure, the support structure having a size and shape locating the fiducials outwardly of the surface and defining an air gap between the fiducials and the surface, the support structure being translationally and rotationally movable; and

a visible light source generating a visible light beam traveling along the predetermined path and being indicative of a direction of approach to the subsurface target.

16. (Thrice amended) A system for defining a direction of approach to a subsurface target by illuminating a predetermined path with a visible light beam, [the subsurface target being located below a surface,]the system comprising:

an imaging machine having an image plane, the image plane having a plurality of degrees of freedom;

a support structure having at least one rotational and at least two translational degrees of freedom;

at least two fiducials mounted on the support structure and situated in the image plane, the support structure having a size and shape locating the fiducials outwardly of the surface and defining an air gap between the fiducials and the surface; and

a visible light source generating the visible light beam traveling along the predetermined path and illuminating the path as a direction of approach to the subsurface target.

26. (Thrice amended) A system for defining a direction of approach to a subsurface target by illuminating a predetermined path with a visible light beam in an imaging machine, [the subsurface target being located below a surface,]the system comprising:
a support structure having a plurality of fiducials defining the predetermined path relative to the support structure, the support structure having a size and shape locating the fiducials outwardly of the surface and defining an air gap between the fiducials and the surface, the support structure being translationally and rotationally movable;
a visible light source generating the visible light beam traveling along the path and illuminating the path as a direction of approach to the subsurface target; and
a computer-based system for executing a set of procedures serving to select the predetermined path by determining an optimal path to the subsurface target.

36. (Thrice amended) A method of determining a path to a subsurface target for use with imaging equipment having an image plane and an output device, [the subsurface target being located below a surface,]the method comprising the steps of:
supporting a plurality of fiducials situated in the image plane, the fiducials being located outwardly of the surface in a manner defining an air gap between the fiducials and the surface and mounted to a support structure, the support structure being translationally and rotationally movable;
observing positions of images of the plurality of fiducials in the output device; and
utilizing the positions of the images of the plurality of fiducials to determine the path to the subsurface target.

46. (Thrice amended) A method of selecting a desired location of a subsurface target in an imaging machine having an output device for use with an apparatus comprising a plurality of

fiducials carried by a support structure, the support structure being translationally and rotationally movable, [the subsurface target being located below a surface,]wherein the method [comprising] comprises the steps of:

positioning the support structure to locate the fiducials outwardly of the surface in a manner defining an air gap between the fiducials and the surface;

positioning the subsurface target relative to the apparatus in the imaging machine such a way that an image of the subsurface target and images of the plurality of fiducials can be observed on the output device and a location of the image of the subsurface target relative to the images of fiducials can be determined; and

repositioning the plurality of fiducials so that a new location of the image of the subsurface target relative to the images of the plurality of fiducials is the desired location.

51. (Thrice amended) A method of positioning an apparatus for determining a direction of approach to a subsurface target in an imaging machine, [the subsurface target being located below a surface,]the imaging machine comprising an image plane having a plurality of degrees of freedom, the method comprising the steps of:

providing a support structure having at least one rotational and at least two translational degrees of freedom;

providing at least two fiducials carried by the support structure;

positioning the support structure to locate the fiducials outwardly of the surface in a manner defining an air gap between the fiducials and the surface; and

positioning the fiducials in the image plane of the imaging machine by moving the support structure along its at least one degree of freedom.